



## MEMORANDUM

TO: Tom Taube, Acting Director, Division  
of Sport Fish

DATE: March 31, 2023

Sam Rabung, Director, Division of  
Commercial Fisheries

SUBJECT: Lower Cook Inlet Escapement  
Goal Memorandum

THRU: Jason Dye, Regional Supervisor, *JED*  
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The purpose of this memo is to report our progress reviewing and summarizing findings for escapement goals for Lower Cook Inlet (LCI). The *Policy for statewide salmon escapement goals* (5 AAC 39.223) recognizes the establishment of salmon escapement goals as a joint responsibility of the Alaska Department of Fish and Game (department) and the Alaska Board of Fisheries (board) and describes the concepts, criteria, and procedures for establishing and modifying salmon escapement goals. Under the policy, the board recognizes the department's responsibility for establishing and modifying biological escapement goals and sustainable escapement goals. Due to changing productivity of a stock or system, escapement goals evolve over time. As a result, during the escapement goal review process, the department evaluates new methodologies and concepts and utilizes the best available data to establish or update escapement goals.

Escapement goals in this management area have been set and evaluated at regular intervals since the 1970s (Fried 1994). This effort has resulted in many of the stocks having long-term historical databases. LCI escapement goals were last reviewed by the department (Otis et al. 2016) during the 2016–2017 board cycle.

Between March 2022 and March 2023 an interdivisional salmon escapement goal review committee, including staff from the divisions of Commercial Fisheries and Sport Fish, reviewed existing salmon escapement goals in the LCI management area. The review was based on the *Policy for the management of sustainable salmon fisheries* (5 AAC 39.222) and the *Policy for statewide salmon escapement goals* (5 AAC 39.223). Two important terms are:

5 AAC 39.222(f)(3) “biological escapement goal” or “(BEG)” means the escapement that provides the greatest potential for maximum sustained yield . . .;” and

5 AAC 39.222(f)(36) “sustainable escapement goal” or “(SEG)” means a level of escapement, indicated by an index or an escapement estimate, that is known to provide for sustained yield over a 5 to 10 year period, used in situations where a BEG cannot be estimated or managed for. . .;”

The committee determined the appropriate goal type (BEG or SEG) for each salmon stock with an existing goal and considered other monitored, exploited stocks without an existing goal. Based on the quality and quantity of available data, the committee determined the most appropriate methods to evaluate the escapement goals. Escapement goals for LCI have typically been reviewed every 3 years, Otis (2001; Otis and Hasbrouck 2004; Otis and Szarzi 2007; and Otis et al. (2010, 2013, and 2016). However, because of the comprehensive reanalysis in 2016, it was determined that a review in 2019 was not required.

There are currently 41 escapement goals in LCI (Table 1). Following are the findings of the escapement goal review committee for LCI escapement goals.

### **Anchor River king salmon**

The committee findings are for a change in the current SEG (3,800–7,600) to a SEG of 3,200–6,400. The spawner-recruit model that was used to develop the current goal was updated using aerial survey data, weir data, and age and harvest data. Based on the updated analysis, the current escapement goal range is one of the most conservative (high relative to Smsy) king salmon goals in the state. Comparing the 2023 stock parameter estimates to the current goal, the lower bound of the current goal approximates Smsy, and the upper bound approximates Smax. Based on this and the updated optimal yield profiles (OYP), the committee finds modifying the current goal to a range of 3,200–6,400 improves the probability of maximizing sustained yield.

### **Ninilchik River king salmon**

The committee findings are for a change in the current SEG (750–1,300) to an SEG of 900–1,600. The current SEG is based on weir counts from the upper brood stock weir operated at river mile 4.8. Weir counts from the upper weir were leveraged with 4 years (2019–2022) of counts from the lower weir (river mile 2.5) to produce updated historical escapement counts expanded to the lower weir location. Given the low contrast and low harvest rates, an escapement goal range of 900–1,600 is warranted using the percentile approach (Clark et al. 2014). On average, approximately 18% of the total run spawns in between the weir locations. The new escapement goal represents a 20% increase to account for the difference.

### **Lower Cook Inlet chum salmon**

Currently there are 12 chum salmon escapement goals in Lower Cook Inlet. The committee findings are to replace all existing chum salmon escapement goals with 3 new district goals that incorporate these same stocks and some additional stocks. For this review the district SEGs were derived by aggregating 47 years of escapement data (1976–2022) for all stocks within each district that were consistently monitored using multiple aerial and/or ground surveys where annual total escapement indices were estimated using the area-under-the-curve (AUC) method. The percentile approach (Clark et al. 2014) was used to develop SEG findings for the Southern (1,500–5,000), Outer (17,500–32,000), and Kamishak Districts (50,000–115,000).

### **Lower Cook Inlet pink salmon**

Currently there are 18 pink salmon escapement goals in Lower Cook Inlet. The committee determined all existing pink salmon escapement goals should be converted to 3 new district goals that incorporate these same stocks and some additional stocks. For this review the district SEGs were derived by aggregating 47 years of escapement data (1976–2022) for all stocks within each district that were consistently monitored using multiple aeriels and/or ground surveys where annual total escapement indices were estimated using AUC method. The percentile approach (Clark et al. 2014) was used to develop SEG findings for the Southern (50,000–110,000), Outer (105,000–235,000), and Kamishak Districts (35,000–150,000).

### **English Bay sockeye salmon**

The current SEG for English Bay sockeye salmon (6,000–13,500) was developed using the percentile approach (Bue and Hasbrouck *unpublished*). For this review, the time series was updated to include recent escapements and the current criteria for applying the percentile approach (Clark et al. 2014). The committee findings are for the English Bay sockeye salmon SEG to be updated to 6,300–12,200.

### **Bear Lake sockeye salmon**

The current SEG for Bear Lake sockeye salmon (700–8,300) was developed using the percentile approach (Bue and Hasbrouck *unpublished*). For this review, the time series was updated to include recent escapements and the current criteria for applying the percentile approach (Clark et al. 2014). The committee finds the Bear Lake sockeye salmon SEG should be updated to 600–8,600.

In summary, the escapement goal committee reviewed 41 salmon escapement goals for the LCI management area with findings to update the ranges for 2 king salmon and 2 sockeye salmon stocks. The committee findings are to eliminate all current pink and chum salmon SEGs and replace them with aggregated district-wide SEGs. Converting individual pink and chum salmon goals to aggregated goals will bring LCI into alignment with other management areas around

## 2023 LCI Escapement Goal Memo

Alaska (e.g., Southeast, Kodiak, PWS) that transitioned to aggregated goals for these species years ago.

A brief oral report will be given to the board at the October 2023 Work Session. A more detailed oral report concerning escapement goals will be presented to the board at the Lower Cook Inlet regulatory meeting in November 2023. These reports will list all current and updated escapement goals for LCI, as well as a detailed description of the methods used to reach determinations on escapement goal changes.

Salmon stock of concern recommendations will be finalized after the 2023 salmon season to include the most recent year's escapements. These recommendations will be formalized in a memo and presented at the board Work Session in October 2023.

## Literature Cited

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Table 1—Summary of current escapement goals and 2023 committee findings for salmon stocks in Lower Cook Inlet.

System	Current Escapement Goal			2023 Committee Escapement Goal Findings		
	Goal	Type	Year Adopted	Range	Escapement Data <sup>a</sup>	Action
<b>King Salmon</b>						
Anchor River	3,800–7,600	SEG	2017	3,200–6,400	Weir/Sonar	Change in Range
Deep Creek	350	SEG	2017	350	SAS	No Change
Ninilchik River	750–1,300	SEG	2017	900–1,600	Weir/Video	Change in Range
<b>Chum Salmon</b>						
Port Graham R.	1,200–2,700	SEG	2017	--	MFS	Replace
Dogfish Lagoon	3,500–8,600	SEG	2017	--	MAS/MFS	Replace
Rocky River	1,500–4,400	SEG	2017	--	MAS/MFS	Replace
Port Dick Creek	1,900–4,300	SEG	2017	--	MAS/MFS	Replace
Island Creek	5,100–11,900	SEG	2017	--	MAS/MFS	Replace
Big Kamishak R.	6,800–15,600	SEG	2017	--	MAS	Replace
Little Kamishak River	8,000–16,800	SEG	2017	--	MAS	Replace
McNeil River	24,000–48,000	SEG	2007	--	MAS	Replace
Bruin River	5,200–10,000	SEG	2017	--	MAS	Replace
Ursus Cove	5,900–10,100	SEG	2017	--	MAS	Replace
Cottonwood Cr.	5,200–12,200	SEG	2017	--	MAS	Replace
Iniskin Bay	5,900–13,600	SEG	2017	--	MAS	Replace
Southern District	--	--	--	1,500–5,000	MFS	New aggregate SEG
Outer District	--	--	--	17,500–32,000	MAS/MFS	New aggregate SEG
Kamishak District	--	--	--	50,000–115,000	MAS	New aggregate SEG
<b>Pink Salmon</b>						
Humpy Creek	17,500–51,400	SEG	2017	--	MFS	Replace
China Poot Creek	2,500–6,300	SEG	2017	--	MFS	Replace
Tutka Creek	6,500–17,000	SEG	2012	--	MFS	Replace
Barabara Creek	2,000–5,600	SEG	2017	--	MFS	Replace
Seldovia Creek	21,800–37,400	SEG	2017	--	MFS	Replace
Port Graham R.	7,700–19,700	SEG	2017	--	MFS	Replace
Dogfish Lagoon Creeks	800–7,100	SEG	2017	--	MAS/MFS	Replace
Port Chatham	7,800–18,100	SEG	2017	--	MAS/MFS	Replace
Windy Cr. Right	3,400–11,200	SEG	2017	--	MAS/MFS	Replace

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Table 1. Page 2 of 2

System	Current Escapement Goal			2023 Committee Escapement Goal Findings		
	Goal	Type	Year Adopted	Range	Escapement Data <sup>a</sup>	Action
Windy Cr. Left	5,400–27,100	SEG	2017	--	MAS/MFS	Replace
Rocky River	11,700–54,800	SEG	2017	--	MAS/MFS	Replace
Port Dick Creek	17,900–49,800	SEG	2017	--	MAS/MFS	Replace
Island Creek	9,600–32,500	SEG	2017	--	MAS/MFS	Replace
S. Nuka Island Creek	2,800–11,200	SEG	2017	--	MAS/MFS	Replace
Desire Lake Cr.	1,500–18,000	SEG	2017	--	MAS	Replace
Bruin River	17,800–103,000	SEG	2017	--	MAS	Replace
Sunday Creek	4,400–24,900	SEG	2017	--	MAS	Replace
Brown's Peak Creek	2,600–17,500	SEG	2017	--	MAS	Replace
Southern District	--	--	--	50,000–110,000	MFS	New aggregate SEG
Outer District	--	--	--	105,000–235,000	MAS/MFS	New aggregate SEG
Kamishak District	--	--	--	35,000–150,000	MAS	New aggregate SEG
<b>Sockeye Salmon</b>						
English Bay	6,000–13,500	SEG	2002	6,300–12,200	PAS/Weir	Change in Range
Delight Lake	5,100–10,600	SEG	2017	5,100–10,600	PAS	No Change
Desire Lake	4,800–11,900	SEG	2017	4,800–11,900	PAS	No Change
Bear Lake	700–8,300	SEG	2002	600–8,600	Weir	Change in Range
Aialik Lake	3,200–5,400	SEG	2017	3,200–5,400	PAS	No Change
Mikfik Lake	3,400–11,000	SEG	2017	3,400–11,000	Video	No Change
Chenik Lake	2,900–13,700	SEG	2017	2,900–13,700	Video/Weir	No Change
Amakdedori Cr.	1,200–2,600	SEG	2017	1,200–2,600	PAS	No Change

<sup>a</sup> SAS = Single Aerial Survey, MAS = Multiple Aerial Survey, PAS = Peak Aerial Survey, MFS = Multiple Foot Survey.